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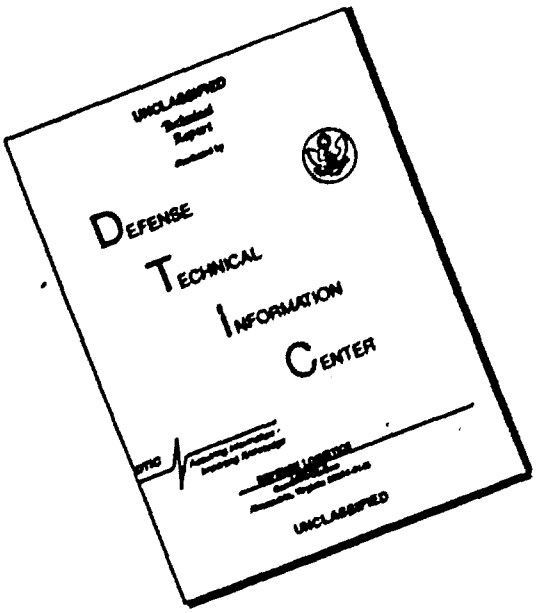

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(8) NEW TOOLS FOR PLANNERS AND PROGRAMMERS

(10) by David Novick,
~~Cost Analysis Department~~
The ~~RAND~~ Corporation

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SUMMARY

The problems involved in U.S. security planning have become matters of increasing concern in recent years. The record, both in the public press and in the Congress, is replete with examples of interest in such matters as the rising cost of defense, the difficulties of obtaining performance as promised, interservice rivalry, the technological race with Soviet Russia and lead time.

Much criticism has been laid at the door of our slow and somewhat cumbersome decision making machinery. Delays in some important programs, costly cancellations of others and the emergence of Soviet Russia and Communist China as dangerous competitors in the nuclear-rocket-space age all have been charged to failures of the current national security organization and the planning and decision making process.

While attention has been focused on the failures of the existing organization and the need for change, too little time has been given to a study of the environment in which the planner and decision maker must now work. As a result, a series of attempts have been made to shore up and strengthen existing organization and procedure without any real definition of the requirements of the planners and decision makers in this era of technological explosion.

Before new machinery can be devised or old tools modified, it would seem that the requirements, or performance objectives, must first be spelled out. As a result, it is the purpose of this paper to discuss:

(1) Some of the conditions which make the current machinery inadequate;

(2) New tools which can meet the needs of the planners and decision makers.

NEW TOOLS FOR PLANNERS AND PROGRAMMERS

by

David Novick

Today's planner and decision maker operate in an environment of uncertainty and change brought about by the technological revolution of the last twenty years. The situation has been aptly described by Lt. General Bernard A. Schriever, Commander, Air Research and Development Command.

General Schriever said about a year ago:

> "The major change in our life has been the shortening of time brought about by what has been called the explosion in technology. This change is due to a technological revolution that began in World War II. Today we are in a technological war in which the battle lines are in the laboratories and in the industrial plants of the United States and the Soviet Union. It is a war that we must win if we are to survive as a free nation.
>
> "Major technical discoveries once came thousands of years apart, and later were separated by centuries, and then by decades. Today such break-throughs are made with startling regularity in every field in intervals of only a few months.
>
> "The leisurely quality that once characterized nearly all our actions, even in making preparations to defend our country against attack, is gone, possibly forever. Today we work against the clock in searching out new techniques and devices which will increase our capability to deter aggression.
>
> "In a situation of this kind a relatively small break-through by one side or the other can overturn the balance of power, on which peace may well depend. In this era of rapid advances a break-through may occur at any time in a laboratory or a test facility, somewhere on earth.
>
> "No matter how hard we work toward new concepts, devices and techniques, we cannot guarantee that they will be discovered only in our country or in those which are friendly to us. But we can guarantee that any advantage occurring to an aggressor as a result of such a break-through will be temporary. One effect of the rapid growth in technology is that no nation retains exclusive possession of a new discovery for very long."[1]

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[1] [illegible]h before the Wings Club, New York City, October, 1959.

These are the facts of life for both planners and decision makers. But what makes life even harder is that the techniques of the factory, military training, construction and even decision making have not been able, as yet, to keep pace with the laboratory. As a result, it still takes many years to translate new scientific discoveries into fully operational systems in the hands of the military.

This means that decisions must be made now which will affect the military capability of the United States, and its position in world affairs, ten years or more in the future. Herman Kahn, in On Thermonuclear War describes the conditions which force at least partial decisions now. He said:

> "The lead time for really new weapons systems, from the point when the "go ahead" on research and development is given to the attainment of appreciable numbers in inventory, is closer to ten or fifteen years, and the system itself should have a useful life of five or ten years more. That is, a system on which R&D is started today will have its useful life in the environment of two to four technological revolutions later. Since it is impossible for fallible humans (and maybe even infallible ones) to project two to four technological revolutions ahead, much of our preparation must be made in a partial fog."*

Thus the planner and decision maker must work in an atmosphere of change and uncertainty and still be able to make decisions which may affect the security of the United States for many years.

However, this is only a part of the environmental picture. The others are equally difficult. The decision and planning process would be relatively easy if there were only one direction in which to move.

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*Herman Kahn, On Thermonuclear War, Princeton University Press, Princeton, New Jersey, 1960, p. 316.

Among the characteristics of the technological revolution is the large number of choices offered by science. Rep. George C. Mahon (D-Tex), chairman of the House Defense Appropriations Subcommittee, describing the pressures to go in many different directions at one time as almost "irresistible", said last spring:

> "It is not an easy chore to pick and choose among competing systems. Nevertheless selections must be made. To try to do everything theoretically possible in all directions to strengthen our defense posture during the long-haul arms race such as we are presently engaged in would be economically disastrous. The decisions which must be made under these circumstances are most difficult. The problem is complicated by the accelerating rate of technological progress which is making weapon systems almost obsolete or at least obsolescent before they become operational. Time has passed by many weapons programs which appeared sound when initiated. Under these circumstances, it is almost inevitable that mistakes will be made, even some major mistakes. The objective must be an adequate defense with a minimum of mistakes. The fatal mistake of too little and too late must not be made. We must also guard against the possibility that mistakes will make us so overly cautious that we retard essential progress."*

In addition to choices in hardware, the selection process must also include alternative military concepts for employing and deploying both the new potentials as well as the materiel on hand or on order.

Another equally important problem is created by the vastly increased capability of new equipment. It has been said frequently that one fusion bomb will do more damage than the combination of all bombs dropped by the United States in World War II. Brigadier General Robert C. Richardson III, Chief of the Long Range Objectives Group, Deputy Chief of Staff, Plans, Headquarters United States Air Force, defined the situation as follows:

> "Of the many problems that face the military establishment, full adjustment to changing technology and to changing weapons capability is perhaps one of the most difficult. The adjustment is made increasingly more burdensome by the equally dramatic impact of the 'cost squeeze' upon our national military posture.

*House Appropriations Committee Report on Defense Appropriations Bill, 1961, pp. 7. (Italics added)

> The result is a growing inability by the military to satisfy commitments and problems in the face of rising costs and relatively fixed resources and concepts."*

The conditions described quite obviously require that managers of national security planning and programs have available a wide range of information and data. To anticipate the problems which will face the United States and to monitor existing national security activities, the following are needed:

(1) A comprehensive and correlated flow of information together with an evaluation of both current commitments and projected programs.

(2) Data on new technological developments and break-throughs and an evaluation of their value in terms of equipment, military concepts and international commitments.

(3) Coordination of planning on an across-the-board basis.

(4) A framework for considering the alternative use of resources of all kinds to achieve national goals.

Resource data are only a part of the information needed to make either plans or decisions. However, resources constitute both the starter for and the brake on the machinery controlled by planners and decision makers. As a result, they properly may be singled out for first emphasis.

Some idea of the magnitude of the resource data problem can be obtained from the statement which appeared in the Navy Comptroller Review, December, 1960. It reported:

> "Today, when an annual budget cycle is completed, the Department of the Navy supporting budget data towers at six feet, according to a recent estimate made in the Office of the Comptroller of the Navy.
>
> "A total of 16,000 copies, encompassing some 500,000 pages of budget justifications and associated data covering each and every account flow into the Pentagon Offices of the Assistant Comptroller, Director of Budget and Reports during each annual cycle...."

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*"The Stalemate in Concepts," Air University Quarterly Review, Vol. XII, No. 2, Sum. 1960, p. 2.

This is without taking into consideration the pages of detailed documents generated by the Army, the Air Force and the Office of Secretary of Defense. Obviously there is something wrong. Arthur Smithies, Nathaniel Ropes Professor of Political Economy at Harvard University, in a paper submitted to the subcommittee on fiscal policy of the Joint Economic Committee (85th Congress, 1st Session, November 1957), said:

> "In the first place, the defense budget is not a document that is readily understood. Even the most assiduous student of it would find it impossible to tell how far the budget provides for a force that will deter a strategic attack on the United States, how far it permits us to carry out our commitments as the leading member of NATO or SEATO or to support other aspects of foreign policy throughout the world. Yet the size of the budget vitally affects these matters. A cut or an increase of say ten percent can make a great difference to the Nation's military effectiveness. Yet neither the Congress, the President nor I suspect the Secretary of Defense and the Service Secretaries has the information needed to relate the financial figures in the budget to any meaningful concept of military effectiveness...." (Emphasis supplied)

How this relationship can best be established has been the subject of considerable discussion, although many of the fundamental requirements now are generally recognized.

What are the key characteristics of a framework designed to permit consideration of the alternative use of resources of all kinds to achieve national security goals?

Time Spans and Plans

As a starting point, it should be noted that plans tend to fall into three categories--short range, middle range and long range. While these three time spans are interrelated, the distinctions between them are useful for the purposes of our discussion:

(1) Short range planning: Here the main emphasis is on projecting in

great detail the activities for the next fiscal year: what must be done, when, where and by whom; and what types and quantities of equipment, men, facilities and supplies are to be acquired. Short range planning necessarily involves stressing administrative and command considerations.

(2) Intermediate range planning: This includes the short range plans and then proceeds to consider a time horizon four or five years into the future. While the basic ingredients include "what, when, where, how much and by whom," detail is much less than in short range plans. In addition, as the time horizon is extended from the immediate future, some flexibility is available to consider alternatives--e.g., systems of various kinds and variations in their employment and deployment.

(3) Long Range Planning: Long range planning uses (1) and (2) as a starting point and then proceeds to consider a time horizon extending ten or more years into the future. Here the main concern is, or should be, with a critical examination of broad alternatives with respect to total forces and missions and key activities. Clearly uncertainties are very great but at the same time the possibility of weighing various choices or alternatives is far greater.

Information Needs

All three types of plans have certain elements in common. They include "end product" activities (i.e. missions and systems used to carry out these missions); time phasing of activities; and resources required to accomplish end product activities--equipment, facilities, personnel, supplies, contractual services, and the dollar costs thereof.

While these factors are important in each type of plan, the emphasis changes as we move from one to the other. Although each of the three

types of plans is needed, long range planning is the most difficult and should be our major concern. As a matter of fact, many of the problems inherent in current short range and intermediate range plans are directly traceable to the failures in or absence of long range projections from which shorter term planning should logically develop.

In long range planning, we start or should start with the national goals or objectives. These are dependent, in turn, on the technological developments which will be available for either waging war or maintaining peace. This immediately brings into the picture the scientific potentials of work now going on.

The alternatives available from the interaction of objectives and potential means are then translated into the projected tasks or missions in which systems requirements are identified specifically. Resource requirements must be considered in these planning possibilities: first, to provide realistic translations of the impact or potential impact of state-of-the art changes and, second, to examine the feasibility or availability of means or expected means for attaining these objectives.

Resource considerations at this stage must be in a form substantially different from that currently identified as "budgeting." In the long range planning area, budgeting may be viewed primarily as a resource translation of plans, to be used as a device for assisting in the choice among various alternatives available to the planners. Resource translations become one test in the determination of whether either plans or choices among alternatives are feasible.

To meet this requirement an "aggregative" type of resource estimating is needed. This means the identification of major kinds and timing of

resource demands--equipment, installations, personnel and maintenance and operating costs. These, in turn, must be "packaged" in terms, first, of the major activity (e.g., general war, limited war, arms control, et cetera) and, second, the alternate means available for accomplishing the activity.

This statement of future resource requirements must be time-phased with and correlated to existing short run and intermediate range plans. For the short run, while management activity is based on the long range plan, it may be expressed and implemented in administrative and functional terms which need not be significantly different from those which we now use. The important point is that the detailed schedule of programs and activities to be undertaken within the next year or two be integrated into the total long range plan.

For the intermediate objective all resource requirements of both intermediate and short range plans should be projected. However, approval need be given to only that part which must be undertaken within the next year to assure the necessary capability 3, 4, 7, 10 or more years in the future.

Here, flexibility is extremely important. Activities must be started on the premise of our longer term objectives and technological potentials. Yet, we must fully recognize that uncertainties both as to requirements and technological progress do exist--that the new nature of international conflict will mean that mistakes will be made and that we may have to both back track and double track (use alternate approaches).

Only with a detailing of actions essential to administration of current programs and a projection of the requirements on which they are based can the flexibility required by current conditions be achieved.

The New Numbers Game

This then is the goal. To achieve it requires a new kind of numbers game. General Thomas D. White, Air Force Chief of Staff, summarized it as follows:

> "The true strategic implications will fall in the future in other areas such as:
>
> a. Adjustments in types of units.
> b. Redisposition of military forces.
> c. The requirement for immediate reaction with its concurrent need for the necessary forces in being.
> d. Constant updating of plans and military concepts to take into account changing weapon capabilities.
> e. A closer understanding and cooperation between all nations who are banded together against a common threat. I will discuss each one of these briefly and in order.
>
> "First, we must consider that some of the improvements in the quality of weapons can compensate up to a point for reductions in their quantity--without degradation of over-all combat capability. This, in turn, may require adjustments in the type of combat units. We continually must strive to secure the best weapons, but not necessarily the most. Obviously, there will always be a measure of quantity below which it would be dangerous to operate. However, the true key to our military security will lie in the proper choice of the best weapons and, of course, the ready availability of highly skilled personnel to operate and maintain them.
>
> "This same principle must be applied to force dispositions. Again, weapon performance capabilities will, to a large extent, dictate the optimum location of combat forces.
>
> "The same factors--speed, range and increased destructive capacity also have dictated--as an absolute requirement--the need for constant alertness and an instantaneous reaction capability within our armed forces. Furthermore, the lack of time available to change force dispositions or to increase force levels after a global war has begun, demands that our forces in being be adequate to perform the initial wartime tasks. No longer can we depend upon mobilization of either military forces or a nation's industrial potential in time to influence the decisive phase of a global war. Moreover, proper forward positioning of strong and suitable shield forces will serve to further deter any form of aggression.
>
> "In this same context, our plans and military concepts must keep pace with new weapons. We should not allow ourselves to fall into the trap of automatically adapting new weapons to old strategies.

> "At the same time, we must not lose sight of the fact that our weapons development program is in the service of our over-all policy objectives. Each new weapon capability must be measured carefully against the mission requirements--and our plans amended where required. You will recall that when the NATO strategy was first conceived, the sword's impact, in terms of time from the United States, would not have been felt for fifteen hours or more. Today, the point of the sword could be on the target within 30 + minutes. The difference lies in the capabilities of the propeller-driven bomber compared with those of the intercontinental range ballistic missile."*

This is a courageous shift from traditional thinking. But steps must be taken to make the translation into both new and improved weapons and into concepts for their use and deployment.

Since the resource requirements will vary not only with the choice of hardware but with the military concepts for their use and deployment, a device is essential for considering the differences in the nature and timing of resource demands that result from possible variations in the choice of weapons, the quantities to be assigned to inventories and particularly the uses to which they will be put.

It is one thing to consider alternatives merely in terms of phasing out old equipment and bringing in the new. It is quite another thing if we consider them against the requirements for men, facilities and the related expenditures to be generated over the years on the basis of such choices as mobility, dispersal, base hardening and the establishment of various kinds of alerts. The information needed must be set out in packages of resources required by years for each of the alternate concepts we can visualize.

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*From an address by General Thomas D. White, Chief of Staff, U. S. Air Force, before the NATO Parliamentarian Conference, Washington, D. C., November 16, 1959.

The current budget format is heavily influenced by functional and organizational considerations. While administrative considerations are obviously important, such an organization of data cannot be used successfully for planning purposes particularly for long range plans.

We need to differentiate between resource information to be used as an aid in making major allocation decisions and the information required to carry out decisions and to manage activities as directed by the Congress and the Executive.

Clearly, these two requirements are different and imply the need for two different types of data presentation. For the planner and decision maker, a format is needed which is oriented towards end objectives and tasks required to implement each of a range of alternatives from which a given plan can be implemented. For administrators and managers, a presentation is required in terms of administrative categories needed for the execution of the individual tasks involved.*

These differences do not require two separate documents--one for planning and the other for administration. What is needed instead is two different presentations of the same information, in which identification can be maintained through coding devices, by the arraying of items by categories.** The summaries used would be substantially different in each of the two cases but the information basis would be identical.

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*See David Novick, A New Approach to the Military Budget, The RAND Corporation, Research Memorandum RM-1759, June 12, 1956, pp. 14-22. The Ford Motor Company is a good example. This company has several types of budgets, including an "administrative-organizational" budget and a budget presented in terms of "end products" or "product lines": Ford, Thunderbird, Lincoln, et cetera

**See David Novick, Efficiency and Economy in Government through New Budgeting and Accounting Procedures, The RAND Corporation, Report R-254, February 1, 1954, pp. 97-101.

At present, long range planning is only vaguely tied to resource requirements. Of course, we do look at some of the activities which have a future time impact, when Congressional funding of authorization is required in the next fiscal year. However, even when the urgent action items are singled out, not enough attention is given to the total of resources which will be required to activate and operate a given system during its long life from conception to phase-out from inventory.

The result is that our resource plans are inadequate to see the whole picture for more than a year or so at a time. This constitutes a major deficiency in our present effort and leads ultimately to an "agonizing reappraisal" or "New Look" in which a costly series of actions must be taken to bring new weapons capability, concepts, commitments and resources back into phase.

Under current conditions, it is essential to an effective planning process that we have a continuous array of the long range implications of current plans.

Our current short range approach is typified by the Defense Department budget format. (Exhibit I.)

Breakdowns of that summary provide separate military department information for the Army, Navy and Air Force, together with a minute detailing of each of the categories. The information is set out in functional classes and is further refined in other parts of the budget document into the traditional object classes.* Despite the wealth of detail, nowhere is the data structured

*The object classes are: personal services; travel; transportation of things; communication services; rents and utility services; printing and reproduction; other contractual services; supplies and materials; equipment; lands and structures; grants, subsidies, and contributions; refunds, awards, and indemnities; taxes and assessments; investments and loans.

Exhibit I. Illustrative Example of Current Military Budget Format

Department of Defense

NEW OBLIGATIONAL AUTHORITY, DIRECT OBLIGATIONS AND EXPENDITURES

Fiscal Years 1960 - 1962

(Millions of Dollars)

	New Obligational Authority			Direct Obligations			Expenditures		
	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962
Military Functions									
Military Personnel	12,026	12,2[illegible]	12,416	11,934	12,196	12,416	11,738	12,142	12,390
Active Forces	[illegible]	[illegible]	10,879	10,582	10,761	10,879	10,390	10,708	10,850
Reserve Forces	[illegible]	[illegible]	611	659	660	611	654	660	614
Retired Pay	715	775	926	693	775	926	694	775	926
Operation and Maintenance	10,[illegible]17	10,[illegible]34	10,642	10,243	10,[illegible]84	10,642	10,223	10,400	10,671
Procurement	13,10[illegible]	13,[illegible]53	13,278	12,732	15,[illegible]33	14,641	14,312	13,753	14,372
Aircraft	6,124	5,29[illegible]	4,695	5,397	6,[illegible]49	5,634	6,487	5,696	5,695
Missiles	3,240	3,[illegible]20	3,816	3,474	3,693	3,971	3,790	3,898	4,005
Ships	1,140	2,246	1,825	1,473	1,866	2,074	1,744	1,674	1,695
Other	2,602	2,[illegible]94	2,841	2,389	2,714	2,961	2,292	2,286	2,576
Research, Development, Test, and Evaluation	4,21[illegible]	4,2[illegible]1	4,349	3,967	4,667	4,365	3,732	4,148	4,385
Military Construction	1,364	9[illegible]5	985	1,350	1,327	1,159	1,626	1,368	1,327
Active Forces	1,291	939	935	1,294	1,260	1,095	569	1,308	1,253
Reserve Forces	73	5[illegible]	50	56	67	64	56	60	64
Revolving and Management Funds	30	30	20	-	-	-	-416	-312	-238
Sub-total	41,058	41,674	41,990	40,225	44,051	43,423	1,215	41,500	42,910
Available by transfer of prior year balances	-430	-366	-150	-	-	-	-	-	-
Total, Military Functions	40,628	41,308	41,840	40,225	44,051	43,423	41,215	41,500	42,910
Military Assistance	1,331	1,800	1,800	1,605	1,896	1,875	1,609	1,700	1,750
GRAND TOTAL, DOD-Military (Military Functions and Military Assistance)	41,959	43,108	43,640	41,831	45,946	45,297	42,824	43,200	44,660

NOTE: Data are adjusted to reflect comparability with FY 1962 appropriation structure.
a/ New obligational availability, including transfers of prior year balances.

16 January 1961

Source: DOD Press Release, 16 January 1961

in terms of the basic missions assigned to the Defense Department or to the "packages" of resources and activities required to carry out these assignments.

The budget is, of course, presented for a period of three years--past, current and one future fiscal year. In terms of obligational authority, much of the procurement money refers to items which will be delivered two, three or more years in the future. However, this future impact is never made really clear and the budget retains its short-range orientation.

As a result, the budget document is not a very useful tool for either the planner or decision or policy maker. It has already been noted that effective planning and programming require a full understanding of the long range implications of decisions to allocate resources. Many types of major items included in the budget in any fiscal year as part of the "buy" program imply definite further investments in future years. They will also require substantial recurring annual outlays to operate and maintain the given activity or system for a long period of years.

To be more specific, most military systems generate a "life cycle" funding pattern over a period of years. Three principal phases occur in the life of each system. They are: (1) research, development, test and evaluation (RDT&E); (2) investment for introduction into the combat inventory;* and, (3) operation and maintenance of the system, once introduced into the force.

While a decision to start system RDT&E does not necessarily imply a decision to procure the system for the forces, a procurement decision once made goes far beyond the scope of a decision to buy a given quantity of

*That is, if the system is actually procured for the active force. Not all systems that have been developed are introduced into the combat inventory.

hardware. The implications of such a decision include: facilities, initial training and acquisition of personnel, housing of personnel, support equipment needed to make the hardware operational, as well as a whole host of other activities all of which must be paid for and all of which must be time-phased if the system is to become operational on schedule.

Equally a decision to procure automatically implies a decision to incur recurring annual operating costs so long as the system remains in inventory. The annual operating cost implications of a proposed investment program is an example of the type of "future" considerations which must be taken into account by those making major resource allocation decisions as well as those engaged in the budgetary review of those decisions.

A full identification of what the decision to acquire a quantity of hardware means in terms of supporting equipment, training of people, and their support, and the timing and cost of these requirements is essential to full understanding of the resource impact of a given decision. As a result end-product orientation rather than functions (as in the present budget) is a "must."

None of the foregoing should be construed as a recommendation for changing or lengthening the appropriation grants. Actual making of appropriations should probably be continued in the current "incremental" fashion. However, the making of appropriations ought to be in the context of long range activity projections, with full knowledge of probable budget implications arising from the decisions now being made. If it did nothing else, Congress would have a far better grasp of military planning and programming problems and would not be "surprised" by the periodic reprogrammings which are required because one service or another suddenly runs out of appropriations and is forced to slip or cancel otherwise worthwhile projects.

The long range budget requirements estimates for this purpose need not (and in many cases cannot) be precise. In most instances it is sufficient to know that an appropriation for X million dollars in a particular activity, commits us to Y millions of dollars (plus or minus 15-20%) annually for a number of years in the future.

One Proposal

One way of arraying military objectives, the tasks involved in each, and their resource budgets over a period of ten years is shown in Exhibit II. The resource summaries under each task should be developed in packages related to each specified activity.

As an example, deterrance system packages might include: Polaris, B-52 Nike-Zeus, Bmews, Atlas, et cetera. Obviously, the designation and selection of systems and concepts is a military responsibility. However, interpretation of international security objectives is a military-political function. And resource translation of systems is an economic or budget function. Final selection of policy and budgets is the responsibility of the President and Congress.

Exhibit II

ILLUSTRATIVE EXAMPLE OF FORMAT FOR AN

Activity Identification	Projected Force Structure (No. of Units)				Exper			
	FY'62	'63	..	'70	Research and Development FY'62	'63	..	'70
CENTRAL WAR MISSION								
B-52 System (incl. ASM's)								
Polaris System								
Nike-Zeus System								
ICBM Systems								
Satellite Recon. System								
Early Warning System								
Command and Control System								
:								
etc.								
Non-system Activities								
Total Central War Mission								
PERIPHERAL WAR MISSION								
F-105 System								
VTOL System								
Carrier Task Forces								
Combat Divisions (Army)								
Amphibious Task Forces								
:								
etc.								
Non-system Activities								
Total Peripheral War Mission								
ARMS CONTROL MISSION								
Inspection System (Air)								
Inspection System (Ground)								
:								
etc.								
Non-system Activities								
Total Arms Control Mission								
NON-MISSION ACTIVITIES								
MATS								
MSTS								
General Support:								
Basic research and exploratory development								
Operating cost of headquarters, schools, centers, etc.								
:								
etc.								
GRAND TOTAL								

*For breakdown of major categories see pages 18 and 19.

N ACTIVITY ORIENTED BUDGET

enditures* (or Obligational Authority) in Millions of Dollars

at	Investment				Annual Operating				Total R&D Investment and Annual Operating			
)	FY'62	'63	..	'70	FY'62	'63	..	'70	FY'62	'63	..	'70

2

It is not the purpose of this paper to establish the precise format or detail that should be included in long range projections. However, the following pages will serve as an illustration of the activities which must be considered when a decision is made to start a system in RDT&E or to make an investment in the system for inventory.

In general, the package for an activity should have the following characteristics:

(1) The set should be as all-inclusive as possible so as to help preclude the omission of significant resource elements when estimating the cost of a specified system or force structure. (The "check list" characteristic.)

(2) The categories should be structured in a way that will facilitate determination of those elements of the unit of military capability under consideration which have the greatest impact on total cost, and which are most sensitive to changes in hardware characteristics and/or variations in system operational concept. (The "sensitivity" characteristic.)

(3) Provision should be made for segregating total cost into the three major system phases:* (a) Research, development, test and evaluation; (b) Initiation into the active inventory; and (c) Operation over a period of years after initial phase-in. ("Life cycle" or "phasing" characteristic.)

The most general or aggregated form of item categories might be as follows:

RESEARCH, DEVELOPMENT, TEST & EVALUATION

Systems RDT&E
Nonsystem activities

INVESTMENT

Installations

Equipment:
Primary mission
Specialized
Organizational

*These cases also correspond to the three basic types of military decisions: R&D, procurement, and operations.

Stocks:
- Initial stock levels
- Equipment spares & spare parts (initial)

Initial training

Miscellaneous:
- Initial transportation
- Initial travel
- Intermediate & support major command investment cost

ANNUAL OPERATING

Equipment and installations replacement:
- Primary mission equipment
- Specialized equipment
- Organizational equipment
- Installations

Maintenance:
- Primary mission equipment
- ***Specialized equipment***
- Organizational equipment
- Installations

Pay and Allowances

Training

Fuels, lubricants and propellants:
- Primary mission equipment
- Support equipment

Services and miscellaneous:
- Transportation
- Travel
- Other

Intermediate and support major command operating cost

Supporting data breakdown may be visualized by singling out the item given three stars above. It is:

Specialized equipment. This category includes those items of support equipment which are specialized to the primary mission equipment. For many future systems (especially ballistic missile and satellite systems)

it may be the largest single element in total system investment cost.

Details for specialized equipment vary by type of system. Three examples are given below:

(1) Specialized equipment for a high performance interceptor aircraft system:
- Aircraft servicing equipment
- Special trucks and trailers
- Airborne missile servicing equipment
- Shop machinery and test equipment
- Shop tools and equipment
- Base support equipment
- Specialized simulation equipment

(2) Specialized equipment for a ballistic missile system:
- Launching
- Missile handling
- Control
- Checkout
- Power and pressurization
- Cabling and communications
- Special transport vehicles (mobile systems only)
- Special maintenance equipment
- Special simulation equipment (for training purposes)
- Miscellaneous

(3) Specialized equipment for a satellite reconnaissance system:
- Launching
- Checkout
- Tracking
- Readout
- Maintenance
- Communications tie-in network
- Miscellaneous

This kind of information on specialized equipment and each of the other listed categories provides a framework for identifying action items at each of the three points of possible change--RDT&E, investment and annual operating outlays--once a decision has been taken. It permits evaluation of the resource significance of change both in current and future planning activities. A decision to start RDT&E by its very nature implies a basic uncertainty as to the potential success of the project. A determination to introduce equipment into the combat inventory no longer means that the equipment will be used as originally

planned since both our own and our potential enemy's science and technology are advancing so rapidly. Even current operations must be continuously reviewed since the present rate of obsolescence is most rapid.

Conclusion

The development of new tools of the type here described should go a long way towards easing the current burden on planners and decision makers in the national security area. While in no sense a panacea, meeting the data requirements outlined, should facilitate dealing with the uncertainty with respect to what is required in the way of defense funds in the nuclear-rocket-space age.

With a full picture of potential decision points available together with time-phased resource impacts of new systems, it should be possible to avoid the necessity of or at least reduce the likelihood of delays in important programs, and of the necessity for costly cancellation of others--a common occurrence in recent years.